

## WHAT IS CLAIMED:

- 1 1. A fluent control valve comprising:
  - 2 a housing having an upper end that includes an inlet port and a valve plenum,
  - 3 and a longitudinal axis that extends from said upper end to said lower end;
  - 4 a fluid-control plate having a fluid-control surface (FCS) with a central control
  - 5 region and an FCS outer perimeter, said fluid-control plate being assembled in an upper
  - 6 portion of said housing;
  - 7 a nozzle having a nozzle plate at an upper nozzle end and a nozzle inlet with an
  - 8 inlet perimeter, and a discharge end with a nozzle exit, said nozzle being assembled in
  - 9 a lower portion of said housing;
  - 10 wherein said nozzle plate has a flat nozzle inflow surface and a nozzle outer
  - 11 perimeter;
  - 12 wherein said nozzle inflow surface defines a valve plane and said FCS has a
  - 13 slight valve angle relative to a plane that is parallel to said valve plane;
  - 14 wherein said fluid-control plate and said nozzle plate are translatable relative to
  - 15 one another along said longitudinal axis, so as to open and close a flowpath from said
  - 16 plenum through said nozzle;
  - 17 wherein said slight valve angle on said fluid-control plate provides an inflow
  - 18 space between said FCS at said FCS outer perimeter and said nozzle inflow surface at
  - 19 said nozzle outer perimeter when said throat region is closed.
- 1 2. The fluent control valve of claim 1, wherein said nozzle inlet is a circular orifice
- 2 and said inlet perimeter has a radiused nozzle-inlet edge, and wherein said nozzle has
- 3 nozzle walls that flare outwardly between said nozzle inlet and said nozzle exit.
- 1 4. The fluent control valve of claim 1 further comprising a flowpath from said nozzle
- 2 outer perimeter across said nozzle inflow surface into said nozzle inlet, wherein said
- 3 flowpath includes a fluid pintle that is hydrodynamically variable and that forms adjacent
- 4 to said central control region of said FCS, wherein said fluid pintle increases and

5 decreases in size as a function of a fluid flow through said nozzle inlet, and wherein said  
6 fluid pintle provides a high pressure flow control barrier that redirects said fluid flow from  
7 a first flow direction that is parallel to said valve plane to a second flow direction that is  
8 approximately along said longitudinal axis toward said nozzle exit.

1 5. The fluent control valve of claim 4, wherein said flow control barrier is a dynamic  
2 high pressure fluid barrier.

1 6. The fluent control valve of claim 5, wherein said fluid pintle comprises a high-  
2 pressure region that deepens downward into said nozzle from said central control  
3 region of said FCS.

1 7. The fluent control valve of claim 6, wherein said flowpath is essentially free of  
2 obstruction by a solid construct.

1 8. A fluent control system for supersonic flow, said system comprising:  
2 said fluent control valve (FCV) of claim 1; and  
3 a hydrodynamic fluid pintle having a variable shape;  
4 a throat region that is formable between said FCS and said nozzle inflow surface  
5 upstream from said nozzle inlet radius;  
6 wherein said flowpath is adaptable for said supersonic flow, said throat region  
7 providing a transition region for significantly reducing a physical property of a fluid from  
8 a high level to a lower level before said fluid reaches said nozzle inlet and said radiused  
9 nozzle-inlet edge; and  
10 wherein said variable shape of said hydrodynamic fluid pintle adapts to an  
11 opening or closing of said FCV and provides a fluid-fluid control barrier for re-directing  
12 said flowpath toward said nozzle exit.

1 9. The fluent control system of claim 8, wherein said physical property is  
2 temperature.

1 10. The fluent control system of claim 8, wherein said physical property is pressure.

- 1 11. The fluent control system of claim 8, wherein a radius of said nozzle inlet is
- 2 dimensioned to minimize fluid losses and heat transfer in said nozzle.